LOCATION, GEOLOGIC SETTING, AND PRODUCTION HISTORY OF THE HARVEY BLACKWATER NOS. 1, 3, AND 4 URANIUM MINES, APACHE COUNTY, ARIZONA, AND SAN JUAN COUNTY, UTAH

by

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INTRODUCTION

During the uranium boom of the early 1950's, Harvey Blackwater, a Navajo Indian from Mexican Water, Arizona, held five claims near the Monument No. 2 mine in northwestern Apache County, Arizona (Figure 1). In 1991, while preparing a report on uranium mining in Monument Valley, Utah, for the Utah Department of Natural Resources (Chenoweth, 1991), I discovered some confusion about the locations of Blackwater's mines. Published reports (Johnson and Thordarson, 1966; Chenoweth and Malan, 1973) didn't agree on locations or names, even though the information in the latter report was taken from a U.S. Atomic Energy Commission (AEC) mine-location map (Young and others, 1964). Scarborough (1981, Figure 16) showed three Harvey Blackwater deposits but did not number them.

To help alleviate the confusion, the Grand Junction Projects Office of the U.S. Department of Energy (DOE) allowed me to examine AEC records that were stored in the DOE archives. The documents included the files of Circular 6 of the Domestic Uranium Program. Circular 6 provided for a bonus of up to $35,000 for the initial production from new uranium discoveries. To file for the bonus, operators had to provide the AEC with legal documents and maps showing how the land was acquired, where it was located, and how the orebody was discovered. The operator, Mex-Air Uranium Company, applied for this bonus. A map in the Circular 6 files (Figure 2) gives the precise location of four of Blackwater's claims in Apache County, Arizona, and San Juan County, Utah. (His other claim [Mining Permit No. 47], held jointly with Jessie Black, was contiguous on the eastern side with Vanadium Corporation of America's [VCA's] Monument No. 2 lease in Apache County [Gregg and Evensen, 1989]).

This report describes the location, geologic setting, and production history of the Harvey Blackwater Nos. 1, 3, and 4 claims. (No production is recorded from the No. 2 claim.) Most of the information presented in this report came from AEC records.

LOCATION AND LAND STATUS

The three mines are located in Cane Valley, approximately 4 to 6 mi north of the Monument No. 2 mine and just west of the access road that was used to haul uranium ore from that mine to the VCA mill at Durango, Colorado (Figure 2). This road, which crosses Comb Ridge, was improved by the AEC in 1952 and 1953 (Chenoweth, 1989).

The mines are within the Navajo Indian Reservation. Mining permits and leases were issued by the Navajo Tribal Council and approved by the Bureau of Indian Affairs, U.S. Department of the Interior. Although mining permits could be obtained by individual Navajos only, permit holders could assign the mining rights to an outside individual or company. Assignments had to be approved by the Tribal Council and the Bureau of Indian Affairs. No more than 960 acres of tribal land could be held by any one company or individual, and both the Navajo Tribe and the permittee received royalties from ore production.

Blackwater assigned all three of his mining permits to the Mex-Air Uranium Company of Farmington, New Mexico (later of Monticello, Utah). According to AEC records, Mex-Air was a partnership of C.E. Culver, D.B. Warren, C.H. Teague, and V.O. Marrs.

GEOLOGIC SETTING

The Harvey Blackwater mines described in this report are on the eastern rim of Monument Valley, on the eastern flank of the Gypsum Creek dome, a small anticline on the Monument Uplift. Near the mines, the rocks strike N. 40° E. and dip 4° to the southeast toward the Comb Ridge monocline.

Geologic investigations (Young and others, 1964) show that the three Harvey Blackwater ore deposits are in channel deposits in the Shinarump Member of the Triassic Chinle Formation. These small channels have been scoured into the underlying Moenkopi Formation. This scouring was best observed in the Harvey Blackwater No. 4 underground mine. The sediments filling the channels consist of tan- to white-colored, medium- to coarse-grained sandstone, conglomeratic sandstone, conglomerate, and fine-grained to silty sandstone. The channels trend east-west in the Nos. 3 and 4 mines and northwest in the No. 1 mine (Young and others, 1964).

The host rocks at the deposits are completely oxidized; no mineral identifications have been made. Yellow uranium minerals are associated with carbonaceous fossil plant material and petrified logs in the sandstone. In the late 1950's, I observed large silicified fossil logs at the No. 4 mine.

PRODUCTION HISTORY

Harvey Blackwater No. 1

The Bureau of Indian Affairs approved Navajo Tribal Mining Permit No. 120 to Blackwater on May 25, 1954. This permit covered 86.08 acres in northwestern Apache County (Figure 2). On May 4, 1954, before the permit was approved, Blackwater assigned the mining rights to Mex-Air Uranium Company. The assignment was approved on June 30, 1954.

Surface prospecting had located a radioactive anomaly. Wagon drilling in the anomalous area discovered an orebody at a depth of 10 to 15 ft. In July 1954, Mex-Air shipped 11.75 tons of ore to the AEC ore-buying station at Monticello. The shipment was reported as "Claim 1" and identified as having been mined in San Juan County (Table 1). Because the ore grade averaged only 0.09% U_3O_8 and 0.16% V_2O_5, it was below the AEC's minimum required grade of 0.10% U_3O_8. Thus, no payment was made for this shipment.

Drilling and stripping continued to locate small orebodies. In 1955, 88.64 tons of ore averaging 0.10% U_3O_8 and 0.27% V_2O_5 were shipped to the AEC ore-buying station at Shiprock, New Mexico. In 1956, an additional 28.87 tons averaging 0.27% U_3O_8 and 0.42% V_2O_5 were shipped to Shiprock (Table 1).

Late in 1956, Mex-Air reported to the AEC that drilling during the previous summer had located an additional 200 tons of ore on the No. 1 claim. In the summer of 1957, 161.76 tons of ore averaging 0.26% U_3O_8 and 0.74% V_2O_5 were shipped to Shiprock (Table 1). Those were the last reported shipments from the claim.

Total production from the Harvey Blackwater No. 1 mine from 1954 to 1957 was 291.02 tons, which averaged 0.20% U_3O_8 and 0.54% V_2O_5 (Table 1). All of the ore came from a series of shallow open pits at two locations on the claim (Figure 2). Interestingly, these production figures do not agree with those in Scarborough (1981). Because Chenoweth and Malan (1973) erroneously showed the No. 1 claim to be in Utah and the No. 3 claim to be in

Arizona, Scarborough apparently classified the production results from the No. 3 claim as those from the No. 1 claim.

Harvey Blackwater No. 3

Mining Permit No. 142 was issued to Blackwater on June 10, 1954. The permit covered 65.98 acres in Apache County, labeled Claim No. 2, and 64.85 acres in adjacent San Juan County, labeled Claim No. 3 (Figure 2). While the permit was being approved, Blackwater again assigned the mining rights to Mex-Air. The assignment was approved on July 26, 1954.

Prospecting had located surface radioactive anomalies in the areas covered by both claims. Mex-Air drilled the areas of surface radioactivity and located a shallow orebody on the No. 3 claim. In August 1954, the company shipped 446.63 tons of ore to the AEC ore-buying station at Monticello. Those shipments averaged 0.16% U_3O_8 and 0.04% V_2O_5 and were identified only as "Claim 3" (Table 1). Early in 1955, an additional 130.45 tons averaging 0.13% U_3O_8 and 0.05% V_2O_5 were shipped to Monticello. The property has been idle since then. Total production from the Harvey Blackwater No. 3 mine was 577.08 tons, which averaged 0.15% U_3O_8 and 0.04% V_2O_5. No production was reported from the No. 2 claim on the same mining permit. The ore came from a shallow open pit approximately 500 ft northeast of Milepost Marker 235 on the Arizona-Utah border.

Harvey Blackwater No. 4

Mining Permit No. 291 was issued to Blackwater on June 15, 1955. This claim of 68.4 acres was approximately 2,000 ft southwest of the No. 1 claim (Figure 2). Assignment of the mining rights to Mex-Air, now of Monticello, was approved on August 4, 1955.

The permit covered an area of surface radioactivity that Mex-Air geologists had discovered by prospecting with a handheld scintillation counter. A drilling project in late summer, consisting of 10,000 ft of wagon drilling in holes that averaged 65 ft in depth, located a small orebody with an average thickness of 2 ft. A 70-ft-long drift was driven to intersect the orebody. The portal of the drift was in the valley of Cane Wash (Figure 2).

In December 1955, a total of 146.21 tons of ore averaging 0.10% U_3O_8 and 0.23% V_2O_5 were shipped from the underground mine to the ore-buying station at Shiprock (Table 1). In January 1956, 39.65 tons were shipped to Monticello. This shipment averaged 0.31% U_3O_8 and 0.44% V_2O_5 (Table 1). The higher grade was due to more selective mining and improved ore-sorting practices.

Mining continued in February and March 1956; the ore was stockpiled at the mine. Drilling during the summer of 1956 failed to locate any additional ore. In September 1956, 187.90 tons of ore averaging 0.26% U_3O_8 and 0.42% V_2O_5 were shipped from the stockpile to Shiprock. That shipment was identified as "Blackwater 4" from San Juan County. Total production from this underground mine was 373.76 tons, which averaged 0.20% U_3O_8 and 0.35% V_2O_5 (Table 1). After mining ceased, Albert S.J. Taylor of the AEC made a map of the underground workings (Figure 3). Taylor noted that the better grade ore was on the flank of the small Shinarump channel within the mine.

ACKNOWLEDGMENTS

Peter Mygatt, Public Affairs Specialist of the DOE's Grand Junction Projects Office, allowed access to the AEC files so that confusion about the locations of the Harvey Blackwater mines could be resolved. Emily Creigh DiSante of the Arizona Geological Survey reviewed this report and greatly improved it.

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Table 1. Ore production, Harvey Blackwater Nos. 1, 3, and 4 mines, Apache County, Arizona, and San Juan County, Utah.

YEAR	TONS OF ORE	POUNDS U_3O_8	% U_3O_8	POUNDS V_2O_5	% V_2O_5	DELIVERY POINT	NAME USED AT DELIVERY POINT
Harvey Blackwater No. 1 (MP-120), Arizona							
1954	11.75	20.04	0.09	37.92	0.16	Monticello, UT	Claim 1[1]
1955	88.64	177.28	0.10	478.67	0.27	Shiprock, NM	Harvey Blackwater 1
1956	28.87	153.17	0.27	243.32	0.42	Shiprock, NM	Harvey Blackwater 1
1957	161.76	842.00	0.26	2,384.84	0.74	Shiprock, NM	Harvey Blackwater 1
TOTAL	291.02	1,192.49	0.20[2]	3,144.75	0.54[2]		
Harvey Blackwater No. 3 (MP-142), Utah							
1954	446.63	1,459.29	0.16	377.22	0.04	Monticello, UT	Claim 3
1955	130.45	335.11	0.13	136.92	0.05	Monticello, UT	Harvey Blackwater 3
TOTAL	577.08	1,794.40	0.15[2]	514.14	0.04[2]		
Harvey Blackwater No. 4 (MP-291), Arizona							
1955	146.21	292.41	0.10	672.54	0.23	Shiprock, NM	Harvey Blackwater 4
1956	39.65	245.81	0.31	348.88	0.44	Monticello, UT	Harvey Blackwater 4
1956	187.90	993.05	0.26	1,573.95	0.42	Shiprock, NM	Blackwater 4[1]
TOTAL	373.76	1,531.27	0.20[2]	2,595.37	0.35[2]		

[1]These shipments were reported as being mined in San Juan County, Utah.
[2]Average concentration.

Source: Unpublished records, U.S. Atomic Energy Commission, Grand Junction, Colorado.

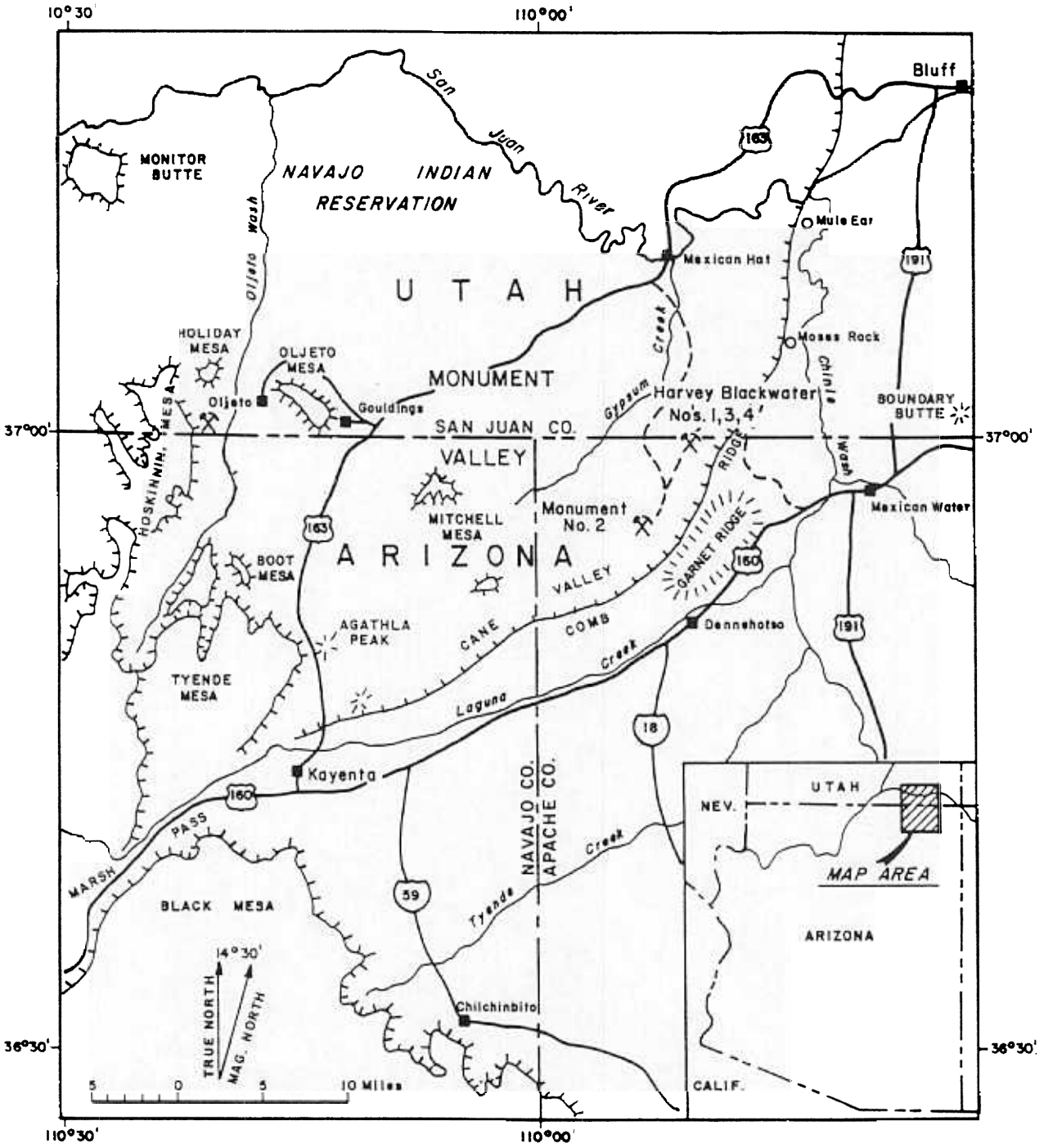

Figure . Index map of Monument Valley, Arizona - Utah showing the location of the Harvey Blackwater uranium mines.

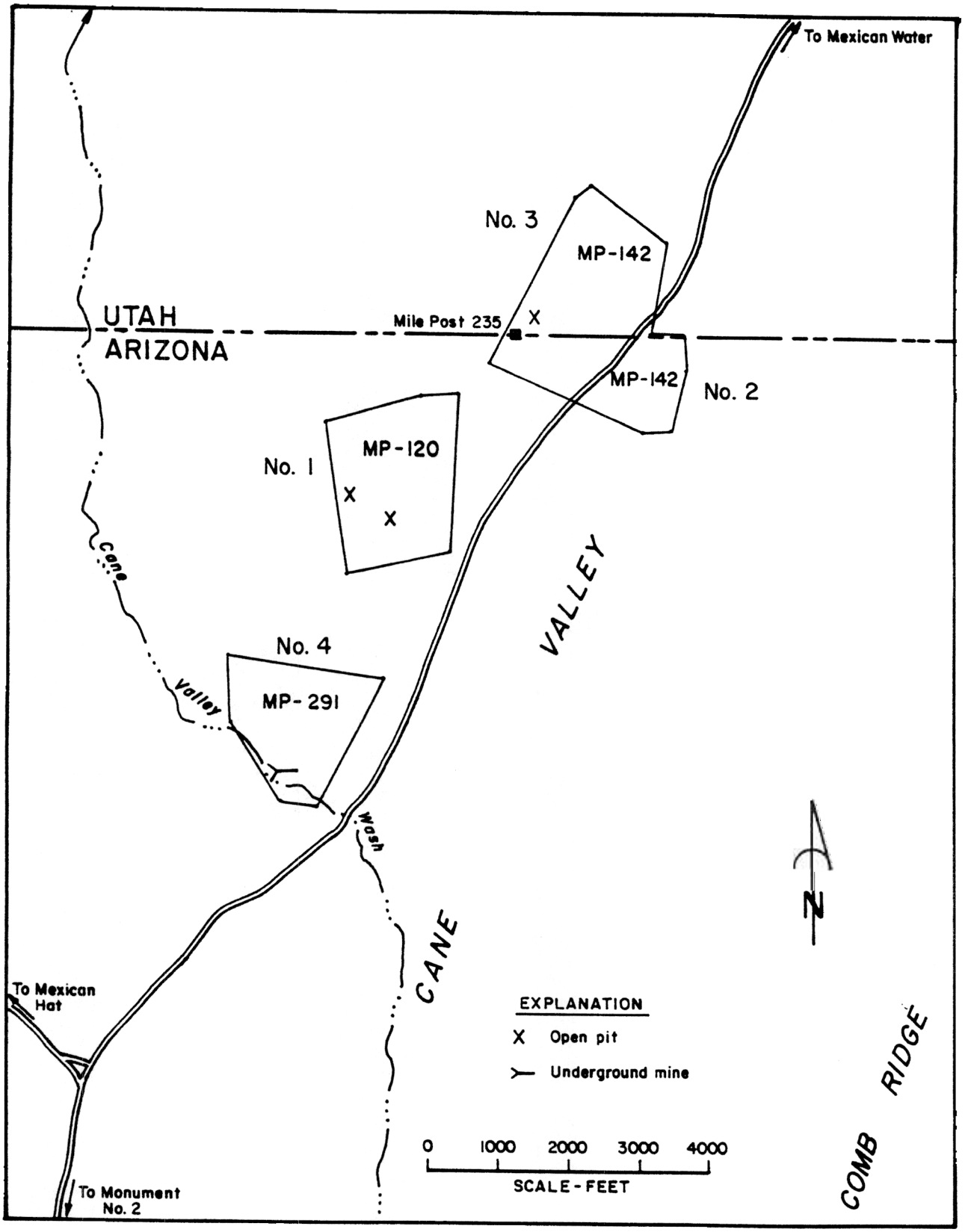

Figure 2. Map showing the location of the Harvey Blackwater mining permits, Apache County, Arizona, and San Juan County, Utah. From AEC files.

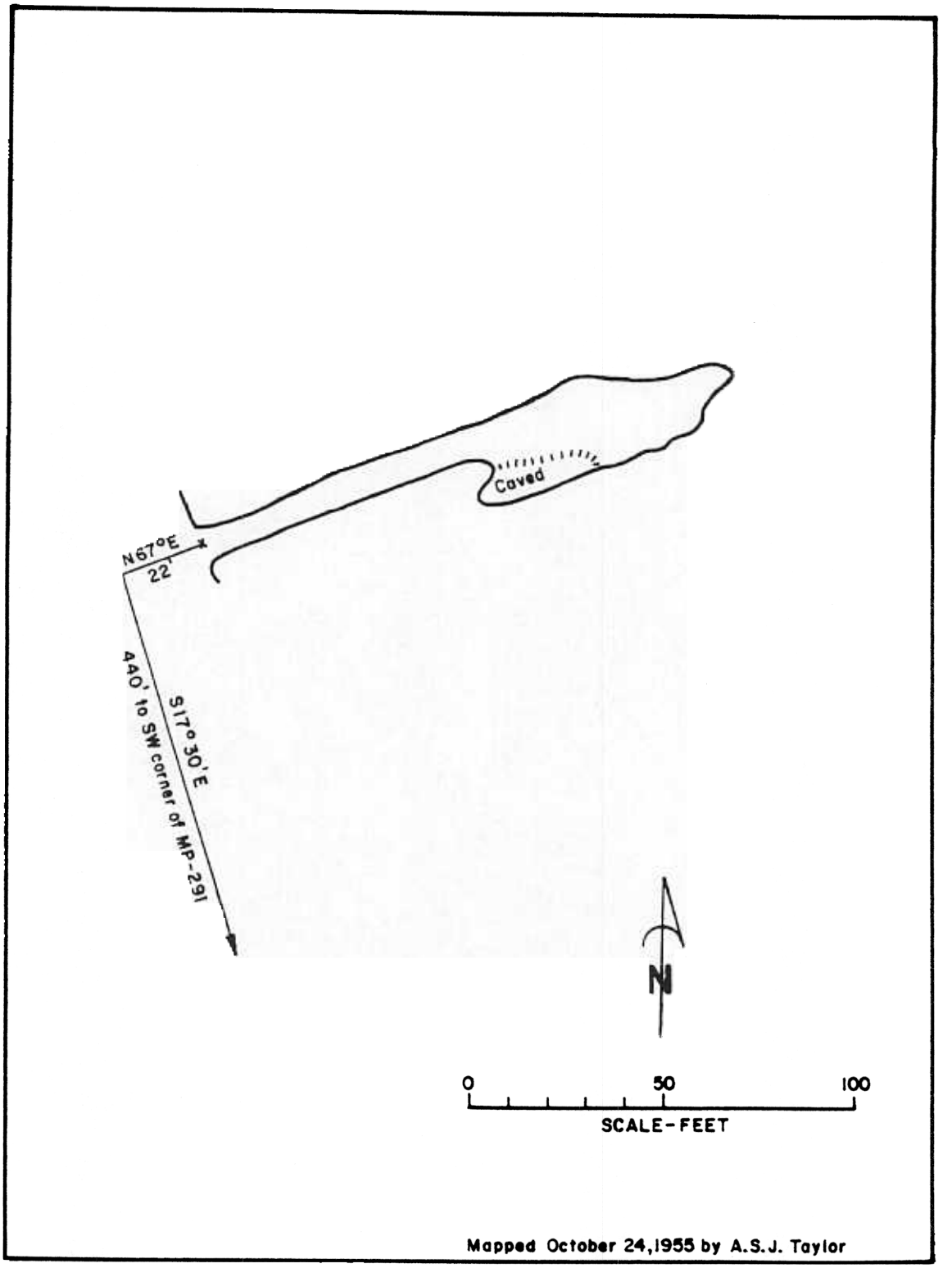

Figure 3. Map of the Harvey Blackwater No. 4 underground mine. From AEC files.